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An intelligent Communication terminal for the Campus-Vehicle Early Warning System Based on RFID

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Abstract

It is very important how to ensure the network connectivity of the RFID reader in a qualified Campus-Vehicle Early Warning System. In this paper, the intelligent communication terminal is presented and will be used to connect the RFID reader and Campus-Vehicle Early Warning network. The terminal automatically choose one of communication channels such as LAN and WLAN or 3G Network, to make RFID reader connected with the Campus-Vehicle Early Warning network. If a communications link in use failed for some reason, the terminal should automatically choose one from other communication channels to repair a network connection, thus ensuring connectivity of the network.

Keywords: Intelligent communication terminal ;RFID; Campus-vehicle early warning

1. Introduction

At present, there are still many shortcomings that RFID system applied in the campus vehicle management system [1], the most prominent is: the intelligent networking of the RFID information node did not form and communication means a single, the node becomes ineffective, thereby, the integrity of the entire system is destroyed. In order to ensure the RFID reader's network connectivity, we designed a intelligent communication terminal to make RFID reader connected with the Campus-Vehicle Early Warning network and the terminal uses an embedded platform, it can automatically select a means of

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communication from the LAN and WLAN or 3G Network, etc. If a communications link in use failed for some reason, the terminal can automatically select another links to repair the network connection, thus ensuring the maximum availability of the system.

2. Working Principle of the Campus-Vehicle Early Warning System

In the traditional campus-Vehicle management system, we just can verify the legality of the vehicle's movement at the entrance, events occur frequently that the stolen vehicle through the entrance forcibly. To change the status quo, We use the characteristics that RFID system can non-contact read data and design a model of double identity, it can detect the illegal movement of vehicles and give early warning information, so, at the entrance, the security personnel can gain valuable response time to take some measures for the vehicle, by do this, we can greatly reduce the theft risk of the campus's vehicles and improve the safety of the managed vehicles. All the managed vehicles should install Anti-metal UHF RFID Tag, and the driver must carry his own UHF RFID Tag when he want to drive through the entrance; Normally, when a vehicle comes into the read range of UHF RFID Reader, the information of driver and vehicle that stored in UHF Tag will be read out, and it will be send to the information terminal by use the intelligent communications terminal, and then the information terminal can determine the status and notify the control terminal of vehicles permitted to be released after data matching; Another situation , when the vehicle occurred illegal moving, because the driver has no Legitimate UHF Tag, so the data which be read and delivered to the information terminals just contains vehicle data, the information terminal will notice the control terminal to close the barrier and then send early warning information to the security personnel. Working principle of the campus-vehicle early warning system is shown in Fig 1.

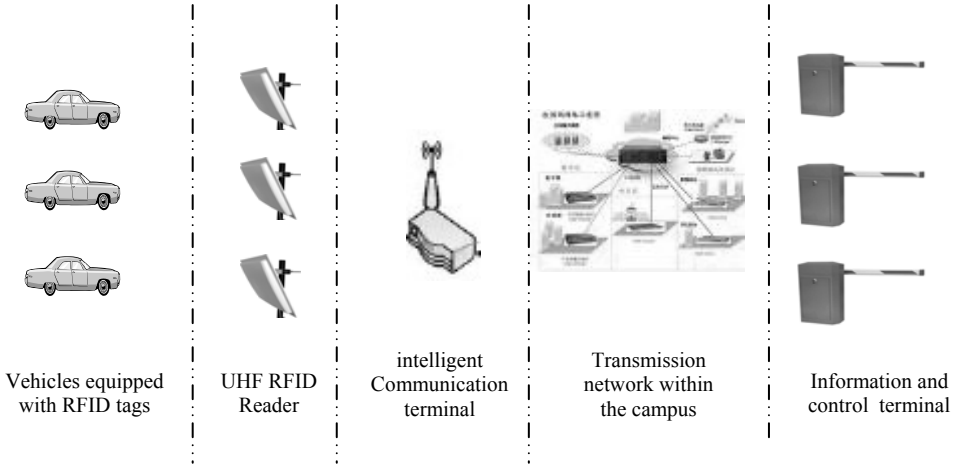

Fig.1. working principle of the campus vehicle early warning system

In this system, it is one of the key factor that how to utilization several transmission network to achieve maximum availability of the RFID reader. Therefore, we designed an intelligent communication terminal to connecting RFID readers and early warning network, through the terminal to achieve the integration of multiple means of communication.

3. Design of Intelligent Communication Terminal

The core function of the terminal requires it can automatically select a communication mode from LAN, WLAN and 3G Network to connect the RFID reader and the campus-vehicle early warning network. If the using communication link failed for some reason, the terminal can automatically select one means of available communications to repair the network connection [2,3]. The system model is shown in Figure 2.

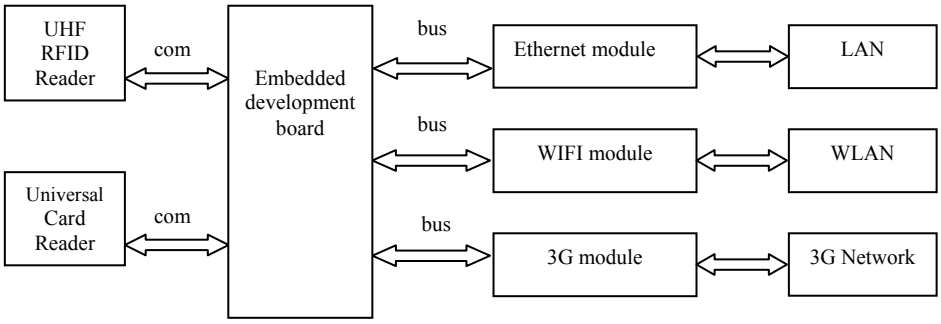

Fig.2. System model Figure

① The UHF RFID Reader and Universal Card Reader can be selected from the market ,the special requirements is equipped with serial communication port , the communication protocol between them and Embedded development board is RS-232C. Universal Card Reader can be a second-generation ID card reader, password input keyboard and other equipments. We deployed the second generation ID card system and passwords keyboard, if the driver does not carry his person's RFID tag, he can change the access control model to password Mode by send a text message to system, so that you can balance the security and humane.

② Embedded development board we use Micro2440 development board design. Micro2440 the Micro2440 core board with Micro2440SDK panels, CPU Samsung S3C2440, clocked at 400Mhz, the highest frequency up to 533Mhz, the size of integrated 64M SDRAM, 64MB size of the Nand Flash, 2M size of NOR Flash, integrated RJ-45 network interface, RS232 Interface and TTL interface, serial interface, USB interface, standard SD card connector, LCD and touch screen interface, 3.5-inch NEC LCD screen, etc., using the development board can achieve all of the features of this module requires.

③ Ethernet module development board use integrated Ethernet chip; WIFI module we use RT2070 chip solutions ,it compatible IEEE 802.11b / g standard. In a typical outdoor environment, the transmission distance can reach 300 meters, the transmission rate up to 54Mbps, and supports Windows /Linux/ WinCE and other operating systems. Through this module, intelligent communication terminals available within the park can be hot with wireless communications; 3G module we chose ZTE MU301 module, the module is compatible TD-SCDMA (Time Division-Synchronous Code Division Multiple Access) standard, the standard PCIe 1.21 industrial port, using an external antenna. Through this module, intelligent communication terminals can be moved by means of 3G networks in China to complete the data communication.

After completed the hardware selection and design, we using JAVA prepared the communication management software. The flow chart is shown in Figure 3.

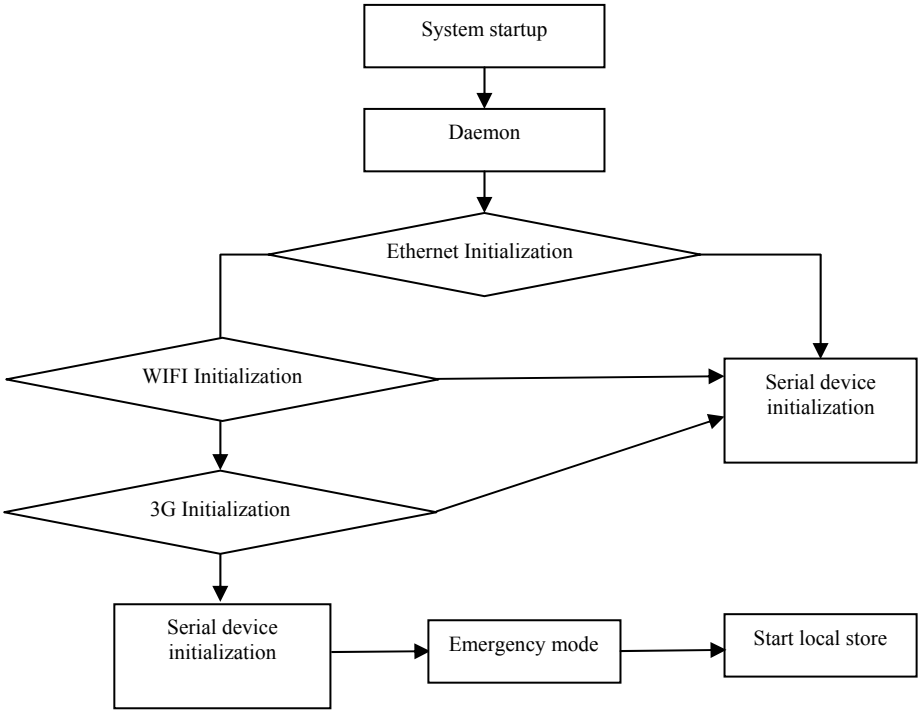

Fig.3. flow chart

The system startup module is mainly responsible for the detection system, what are the available communication links, communication links for the choice of the order [4]: Ethernet is the preferred, followed by WIFI, because both links are already in the park, building And use the lowest cost, performance, relatively reliable, if the first two links are invalid, the system will choose to use the ISP's 3G network to carry out ad hoc communication, submitted to the current situation to the monitoring program in order to repair the failure in time management Communication links; Daemon is started with the system, it will monitor the real-time communication terminal and the system server network connectivity, and give feedback, if the current link failure, it will disable the current network adapter being used, And then start the other by a predetermined order the network adapter to complete the circuit switching, and then continue to monitor [5]; also be noted that: If it is failed communication link, the system goes into emergency mode and enable local store, the Node, the temporary loss of an early warning function, this time out of the vehicle entrance to the need for manual data comparison.

4. conclusion

The RFID technology have long applied in the vehicle access control system, but because of the RFID Reader's communication mode was single, it can not achieve transparent deployment in large park, the advantages of RFID technology has been not a good play. This intelligent design allows this type of communication terminal with a serial communication interface front-end equipment and reliable access to campus network, to achieve a large park in the transparent deployment of RFID Reader,

making the park a vehicle management system with early warning function, greatly improving Managed out of the vehicle safety and efficiency.

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